CONSCIOUS MIND IN NATURE.

THE TWELFTH CAMBRIDGE LECTURE. PROF, AGASSIZ CLAIMS THAT HE THAS BEEN MISINTER-

PRETED-ABSENCE OF EVIDENCE FOR THE EVOLU-TION THEORY IN THE ADMITTED FACTS OF EM-BRYONIC SIMILABITY-CREATION THE WORK OF MIND AND NOT A PRODUCT OF LAW.

IPROM AN OCCASIONAL CORRESPONDENT OF THE TRIBUNE. CAMBRIDGE, Mass., June 16 .- The following lecture was delivered by Prof Agassiz before the Museum

of Comparative Zoology on the 29th of May: I intend this closing lecture of the present ce to be a summary of the preceding ones, and at the same time an introduction to the course I hope to give next Autumn on the succession of organized beings in past geological times. Allow me to say that these lectures have not been compiled from established sources of knowledge. I have tried to give you the freshest results of investigation not yet incorporated in text books and manuals. In so doing I have drawn largely from my own resources, and in approaching the subject to-day I am forced to say one word more of myself. It was my good fortune early in my scientific career to reach certain generalizations which are generally accepted now by scientific men, and which are used, singularly enough considering my own position with reference to it, to support the transmutation doctrine. I read, in order to show you that I do not make this statement loosely, some extracts from a pamphlet entitled De l'Origine dei Monde Organique, just published by Prof. Martins, the Director of the Botanieal Garden in Montpelier, and one of the leading scientific men of France. Speaking of those who have laid the foundation for the present state of the science of Natural History, he names in succession the prominent investigators of the beginning of our century, and then coming to more recent times,

Another of these precursors of modern science is Loui Another of these precursors of modern science is Louis and the has proved that pulsontological development may be compared to that of the embryo. While the animal now living rise through many stages during their growth, the fossils have followed a similar line in pages. The oldest fossil forms have a simpler organization than the later ones, and represent some stage of the embryonic development of the latter. This truth, established by Agassiz, has more than any other enhelitement in his properties of the comprehended. In specific residual, the properties of the generalization by which the whole may be comprehended.

To sum up the question, we may state that whether we follow, with Bacr, the growth of an animal in the womb of its mother, or rise with Darwin and Hockel from the lowest to the highest living being, or trace with Agnesic the fossils scattered through the whole series of geological formations, we sindy parallel phenomena, the investigation of which leads to concurrent results isutually explained.

And more constitutions. In another place the writer says:

And more especially:

The oldest fishes known are all more or less related to the snarks and skates; their teach and their scales only, with small portions of their skeleton, have been preserved. Their form, widely different from that of the living species, recalls that of the embryo of our living fishes. This is a truth which Agassiz was the first to proclaim to the scientific world. He confirmed it when he showed that the young garpike, Lepidosteus, that strange fish of the fresh waters of North America, has a tail strikingly similar to that of the fossils of the Devonian age. Here we touch as it were the parallelism between the paleontological and the embryoone series. An admit fish of the Devonian period is the embryo of a fiving species, both derived from identical eggs. Only that in the first ages of our globe the fossil lish has stopped in its development. It has preserved its embryone form, while the ityms fish has continued its evolution and risen many degrees in the scale of animal life. And more especially:

As you perceive, my results are here admitted without reservation, but they are presented as forming an essential part of the very foundation of the transmutation theory.

EMBRYONIC LIKENESS NO PROOF OF DERIVATION. How does it happen then that there is so complete an antagonism between my views and those of the adherents of this very deetrine? Simply because their interpretation of the facts is based upon a fancied identity between phenomena which, so far as we know, have not, and in the nature of things cannot have, any material connection. It is true that, as stated in the work above quoted, the series of transformations observed in the egg corresponds in a general way to the succession of animals in geological times. Embryonic conditions of the higher Vertebrates to-day recall adult forms of lower Vertebrates in the earlier geological times. From this fact the transmutationists infer that there has been some material development in the long sequence of ages of the one out of the other. But the embryonic conditions of the higher Vertebrates recall adult forms of lower Vertebrates now living, their own cotemporaries, just as much, and in the same way, as they recall the fossil forms. Shall we infer that because a chicken or a dog in our own day, in a certain phase of its development, resembles. that birds and quadrupeds are fish and reptile-like be in certain aspects, a fall-grown skate, that therefore chickens and dogs now-a-days grow out of fishes? We know it is not so; and yet the evidence is exact Iv the same as that which the transmutationists use so plausibly to support their theory. The truth is that while a partial presentation of the facts seems to sustain this theory, when taken in their true connection and fairly stated they destroy it by proving too much. They show that the relations between fossil animals supposed to prove descent, exist also between living animals, where they have nothing to do with descent.

. It is true that the series of growth (that is, the successive changes in the egg), and the series of time (the successive introduction of animals in the geological ages), cover the same ground; they correspond remarkably. But there are other like series in nature, parallel with these, and of equal importance. Of one I have just spoken-the series of rank among living animals. By this I mean that, taking Vertebrates as they at present exist, we recognize a gradation among them. We see that fishes are lowest, that reptiles are higher, that birds have a superior organization to both, and that mammals, with man at their head, are highest. The phases of development which a quadruped undergoes, in his embryonic growth, recall this gradation. He has a fish-like, a reptile-like, stage before he shows unmistakable mammal-like features. We do not on this account suppose that a quadruped grows out of a fish in our times, for this simple reason, that we live among quadrupeds and fishes, and we know that no such thing takes place. But resemblances of the same kind, separated by geological ages, allow play for the imagination, and for inference unchecked by observation.

GRADATION OF ANIMALS BY RANK. Difference of structural rank prevails throughout

the animal kingdom, both in larger and in minor groups. We have it in the animal kingdom as a whole, and in each smaller division. Let me explain this gradation first in its larger sense. No one has ever considered the Radiates as standing on a level with the Vertebrates. All naturalists agree in considering the former as the lowest type of the animal kingdom. All agree also in considering Vertebrates as the highest type. All place the Articulates and Mollusks between the two; some on a line designating equality, while others place the Mollusks be low the Articulates, or the Articulates below the Mollusks, according to different estimates of their relative structure. Some such relation between these grand divisions of the animal creation all acknowledge. But let us go a step further. There is a gradation among Radiates as compared with each other. Of the Polyps, or lowest class, the naked and simple forms, like the sea-anemone, stand below the stony corals: and among the stony corals the madrepores stand structurally higher than the other groups. Among the Acalephs or jelly fishesthe second class of Radiates-we have the Hydroid, so simple in structure that did we not see the Acaleph born from it we should rather associate it with the Polyp than with any higher group, or the Discophores to which the large disk-like jelly fishes belong, or Ctenophores, animals of exquisite delicacy and beauty, and more complicated structure than either Discophores or Polyps. Above the Acalephs come the Echinoderms, or star fishes, sea-urchins and Lolothorians, relatively distinguished from each othg by a progressive complication of structure hom the Crinoids through the Ophisurians, steroids, and Echinoids to the Holothurians. The same is true of the Mollusks as of the Endiates. We divide them according to relative superiprity or inferiority of structure. Lowest stand the Acephala-oysters, clams, and all the bivalve shells-then come the Gasteropoda or univalves, with their endless and then the Cephalopeda-ail the Nautil, chambered ditions embraces the whole life of the one, and the other New York, June 17, 1874. variety of shells in spirals, wheris, cones, or flat disks,

shells, and cuttle fish. So with the Articulates. The most careless observer will notice the gradation between the simpler worm, the more complete crustacean, and the still more highly organized insect. The comparative standing of different classes in the Verte-brate type is so well known that I need not secall it to you, and, if we take any one of these classes separately, we put the gradation just as marked with each class.

That is, fishes, reptiles, hirds, and mammals may be subdivided according to details of structure by which they stand relatively higher or lower. This series of rank, sleterwined upon relative complication of structure, is recognized by all zoologists, and is, as I have shown, not a simple series, but involves endless minor series, based in the same way upon structural characters.

GEADATION OF RANK PARALLELED IN GROWTH In what I have called series of rank or gradation I allude only to ammals in the adult condition, taking as a standard of somparison the complication of their structure when full grown. But we have something of the same kind in the series determined by growth : that s, by the changes which animals undergo from the time when the whole mass of substance is nothing but an accumulation of yolk cells, presently combining to form the germ layer resting on the yolk and successively passing through phases which develop the outline of a new lates, all Vertebrates, are developed each within its own type, according to a given pattern of growth, and, up to a certain point where class features, ordinal features, family features, make their appearance, they show only typical characters—that is, what belongs to them as members of their type, but not what characterizes them as members of any particular group within that type. But within each such general series of growth are minor series, determining special characterizes. The Vertebrates have a mode of development peculiar to themselves, and so similar that, as we have seen, it is difficult to distinguish the human embryo from that of any quadruped. But within that general Vertebrate series of growth, we have minor and more special series; those upon which the doc, the decr, the guinea pig, and any given group of Vertebrates are developed. So in the birds; their growth as a whole reminds us of the quadruped strikingly; but they have their invariable and unfairly specific modes of grewth determining their final character as belonging to some particular group of birds. In those animals whose embryology has been carefully studied, the investigator is not misled by general resemblances, for we can anticipate the final result by its connection with antecedent phases; and in each case the skillful empreciation if put on my own facts is more correct that an interpretation of a great law which captivates the minor application of structure. Looking upon all these series of Vertebrate growth as a whole, in the same way that we look upon the type of adult Vertebrates as a whole, we see both sets of phenomena as single pletures; all the minor series of phenomena as single pletures; all the minor series of phenomena as single pletures; all the minor series of phenomena as single pletures; all the minor series of phenomena as single pletures; all the minor series of phenomena as single pletures; all the minor series of phenomena as single pletures; all the minor series of phenomena as single pletures; all the minor series of phenomena as single pletures; and in the proposed the series of vertebrate growth as a whole, in the same a certain point where class features, ordinal features, phenomena as single pictures; all the minor series of rank and growth melting into one simple series which meludes them all. Looking upon them both in this comprehensive way, we can fairly compare them. There is a time when the human embryo is so like the fish embryothat it is hard to say what is specifically buman and what is specifically fish; later it may be compared to the reptile and to the bird; and its own characteristies are superimposed upon those which it has in common with the lower representations of the type. Such a series of growth, corresponding with a series of rank or gradation, we have among Vertebrates, among Articulates, among Mollustis, and namong Radiates. If you will carefully compare its different phases of development, you will flud that an insect during what we call its metamorphosis represents, first, the lowest Articulates, the worm, in its caterpillar condition; then the crustacea in its chrysalis state, and only takes on its insect features when it is

GENERAL FACTS AS TO STRUCTURAL GRADATION. In a certain sense the structural history of every indi-vidual member of the highest class in any type may be said to be the structural history of the whole type. It is a little more legible to the common observer in the Articulates than in any other type, because the highest ciass undergoes its growth as the distinct chapters of a connected metamorphosis; but it is equally true for all. If I had time I could show you in detail that the Echinoderms, for instance, when forming in the egg, have, first, polyp-like, then acalepu-like features, and that when they finally assume the characteristics of their class (supposing that they belong to the higher species of Echinoderius), they pass through phases of the lower families before they attain their own specific features In short, we may say that the classes within every type, the orders within every class, the families within every order, the genera within every family, and the species within each genus, present a structural gradution more or less marked. The embryology of the higher nimals in each type helps us to understand this grada tion by showing it to us in a progressive development. I do not mean to say that any embryelogy corresponds in all its details to the structural relations of in all its details to the structural relations of full grownsanimals. But when we find that a reptile is fish-like before it assumes a reptillan character; that birds and quadrupeds are fish and reptile-like before they develop their class features, and that even the human embryo passes through phases resembling all these lower groups, we may be quite sure that the rank in which we had arranged them before we knew their embryology is the correct one, since their mode of development confirms it. The same kind of correspondence prevails between embryological development and geological succession. That is, fish were the first Vertebrates introduced upon earth. Then came the great reptiles, then birds, and latest, mammais, quadruseds, and man. We do not yet know how far taese correspondences may be carried, for we are not familiar with the embryological history of a great many animals. But so far as science has gone in the kind of investigation, the results are everywhere the same. Take, for instance, the Echimoderms; the earliest representatives of that class of Radiates were the Crinoids (star-fishes on stems). Now the Echimoderms of the present designs from 20 years of age. Certainly, persons of such control and full grownganiumals. But when we find that a reptile on stems). Now the Echinoderms of the present day pass through a distinct crinoidal phase of development, nd I may add that there is among the present E man derus a lower group the members of which are always ttached to a stem (the Pentacrinus and similar genera), so that in this instance the series of geological succession of embryological development, and of structural rank among the living agree remarkably. I could give you various instances of the same kind; but all these facts elong properly to my course on geological succession and palicontology, next term, and I should only could se your minds did I attempt to present them how. I only bring forward enough to snow this basis for the ardent discussion going on among naturalists during the last ted or twelve years us to the real nature of these relations. The evolutionists, as I have shown you in the extracts with which I opened this lecture, use the parallelism between the series of embryonic growth and geological succession as supporting their theory. But even were the parallelism as complete as they would have i , he evilence is vittated by the fact that it extends to a series of rank among living animals, and, as I could show you, also to a series of the same kind controlling the geo graphical distribution of animals.

But even were the correspondence confined to the suc essive appearance of animals in time and their successive phases of growth, does it prove a common descent ! Does it give us any rational explanation of the means by which the present diversity among animals was brought about? Does it give us any reason to believe that the process of evolution in organic life has ever been different from what we now see going on about us ! RESEMBLANCES THAT SEEM TO BE REMINISCENCES.

In the first place, is the parallelism between these so les of relatious, so curiously reproduced under various reumstances, but always with the same general significance, so exact as to justify us in saying that all are out different phases of the same thing ! It is a resemblance of the same kind as that which we express by the idea of unity, harmony, coherence. It is the utterance of the same truth by the same mind at different times, or the utterance of the same thought in different languages. It is an intellectual unity, not a material connection. We mentally perceive these relations and unite them into a single picture. That picture is the product of our own power of recognizing combinations. We ourselves lift the broken facts into a mirage which, looked upon a distance, seems a perfectly connected whole. But while these general correspondences are unde niable, the details fall apart the moment we try to test them by any material connection. It is true, for instance, that the embryo of the present garpike resemoles the fish of the Devonian period. But, after all, this resemblance is nothing more than a reminiscence, as it were, of a pattern introduced ages ago. The embryo of our garpike has a norm of growth as fixed and invariable as that of any other species. It faintly recalls the old fish giante, but it never develops into anything but the fish from which it is born-a species of very marked and unmistakable specific characters, and very unlike this old type of the Devonian era. The essential difference is that the Devonian fish grew to colossal dimensions, with what we now know to be only transient features during the dwarfish early days of our garpike. Supposing there were no other differences, does the resemblance account for the fact that one of the cou-

condition only the embryonic stage of growth of the other fish! In no way.

No successive evolution of types.

Then while it may be said on the whole in a general sense that lower forms have preceded higher ones, and that embryonic development follows the same progress from the simpler to the more complex structure, it is not true in detail that all the earlier animals were simpler than the later. On the contrary, many of the lower animals were introduced under more highly organized forms than they have ever shown since, and have dwindled afterward. Such are the types which I have called synthetic types, combining characters which were separated later and found expression in distinct groups. That presentation of palaentological phenomena which would make it appear that the whole animal kingdom has been marshaled in a consecutive proces-sion beginning with the lowest and ending with the highest, is false to nature. There is no inevitable repetition, no mechanical evolution in the geological succession of organic life. has the correspondence of connected plan. It has just that kind of resemblance in the parts, so much and no more, as always characterizes intellectual work proceeding from the same source. It has that freedom of manifestation, that independence, which characterizes being and flushly lead to the formation of a perfect, full-grown, living animal. There is, as we have seen, a of law. Sometimes, in looking at this great grown, living animal. There is, as we have seen, a of law. Sometimes, in looking at this great mode of development in each type which may be looked epos of organic life in its totality, carupon as a unit. All Radiates, all Mallacks, all Astern upon as a unit. All Radiates, all Mollusks, all Artheu- ried on with such case and variety, and even playfulness of expression, one is reminded of the great conception of the poet or musician, where the undertone of the fundamental barmony is heard beneath all the diversity of rhythm or of song. So great is this freedom,

LETTERS FROM THE PEOPLE.

STATISTICS OF DEATHS FROM DRUNKENNESS. To the Editor of The Tribune.

Sir: I am not in the habit of noticing the extravagant statements of public speakers; but I observed recently in the journals a report of some remarks made by the Rev. Mr. Boole, which call for examination, in order to test the accuracy of statistics. The reverend gentlemen says that the rum ellers murder annually in the United States 70,000 persons. In addition to this he tells us that the murdered victims of the traffic average one in every ten minutes, which would be \$3,560 more. I presume the fermer set are those killed by drunkenness, and the latter those who are murdered in affrays, riots, &c., traced directly or indirectly to intoxication It is certainly a very formidable exhibition of numbers, but is it true! In assailing the pernicious habit of drunkenness, let us be correct in our data, or we may not only violate truth, but fall into contempt through our recklessness. By the recent Copsus the total number of deaths in the United States for the year ending June 30, 1870, was 492,263, of which 263,673 were males and 231,500 females. The 122,500 persons who die, no cording to Mr. Boole, from intemperance would be within a slight fraction of one-quarter of the whole. As such causes as cholera infantum, measles, scarlet fever, whooping cough, diphtheria, hydrophobia, croup, feething, cyanosis, cancers, old age, and certain nameless and peculiar diseases coming from age, sex, and condition of the atmosphere can scarcely be attributed alcoholic liquor, that would leave only 384,354 deaths out of which to find our alcoholic deaths, which assume the proportion of one deaths, which assume the proportion of one-third. Analyzing the statement in another way, we are met by more difficulty. If the one in ten minutes refers only to violent deaths, we discover that all of that kind occurring during the year mentioned, in-cluding lightning strokes, mining accidents, &c., was 22,740, which is 29,850 less than were killed by run alone. In other words, drunkenness killed more than 100 per centum over those killed at all. Of the deaths in the United States during the only year in which we have trustworthy data, we find that 16,925 males and 124,557 females died under 20 years of age. Certainly, persons of such connegratively tender years could not have di-stroyed themselves through drunkenness. Those who New-York, Jone 3, 1873.

NEW SPAPERS AND RATEROAD-GUIDES AS TEXT BOOKS.

To the Editor of The Tribune. Sin: I man express to you the gratification of many teachers at the course taken by THE TRIB-EXE in educational matters. It is cuccaraging to see the daily papers standing by the best laterests of the people on the subject of education. This Tatauna has furnished many a valuable lesson for "occu instruction" in my school-room the past term. These oral lessons are supposed to supply the deficiency of book-knowledge. Every intelligent too her can appreciate this. On the matter of geograp-y, the books fail to impart fresh geographical knowledge in very many respects. They do indeed present the entra as a sphere on a plane sur face. They present plotures of a portion or the whole of the earth's stirface as it was. We compel our children the earth's surface as it was. We compel our children to stray seven or eight years over the surface of the earth, and when required to find and visit a certoin teva or county in the State of New-York, they do not know whether to reach it by baltoen, Fallroad, or stembeat. Such is the impotency of book knowledge upon the subject. For a glowing picture of the earth's surface of to-day, we must go elsewhere. The text-books fail us. The newspapers and railroad guides must be sought. It would be strange to see newspapers and railroad guides in the class-room. Much time and labor are spent in explaining to the wandering punil all the phenomena of the earth's motions, which few rean can understand. All of this indistinct picture fades quickly from the milid, and the geographical knowledge becomes a blank. More real practical and common sense geographical knowledge can be imparted in one familiar talk, using as guides the artificial globe and the daily newspaper, than can be rained in one month's study of the books. Education means growth and development. It repeis the idea of rained in one month's study of the books. Elucation means growth and development. If repeis the idea of "cramming." True education has some regard to the philosophy of our being. It is not based upon any series of books. It is to be hoped that our new Board of Elucation will take this into account when remodeling the course of study for our boys and girls.

Morrisanta, N. Y., June 14, 1873.

HOW TO SAVE A MILLION.

To the Editor of The Tribune. SIR: True to the instincts of its illustrious and immertal founder, I see that your paper is, as I am sure it will ever be, the fearless advocate of all genuine reform. Many will agree with me that it is to be regretted that the new Board of Education did not adopt the sensible reforms suggested in your very able journal. Those Meas are truly democratic, and in perfect accord with the normal function of public education. Most of the members of the present Board are doubtiess good men, but they are mere novices, and in danger of being misied by the one or two corrupt and designing politicians who have unfortunately imposed themselves upon the Mayor for the most sacced and responsible trusts. The Board can save at least a quarter of a million of dellars a year by adopting the suggestion of only one principal to a sensol, instead of three as at present organized, and the system be far more harmonious and efficient. In the small schools especially, it is well known to the militard that the principalsings are virtual sineoureships. Our people are already grouning under the ourdens of excessive taxation, and although they pay their money cheerfully for the support of schools, they ought not to be required to support too many coastly superimmeraries just to grantly the gretted that the new Board of Education did not adopt port of schools, they ought not to be required to support too many costly supernumeraries just to gratify the politicians. Again, one-half of the small grammar schools, many of them mere skeleton organizations, ought to be closed. Their curporal's guard of scholars could be readily absorbed by the larger schools in their humediate vicinity, greatly to the relief of the tax-payer and to the manifest good of the wane system. Let us Bogrid adopt and fainfully carry out these sugestions, and they will save at least \$1,000.00 in first year (no despicable item in these times), while the system of public stactation will reach far more thoroughly and successfully that great mass of people for while it was designed than it has ever done before. Kerokia.

APPLIED SCIENCE.

REMOVAL OF INK SPOTS FROM COLORED FABRICS. -A solution of pyro-phosphate of soda, it is said, will quickly remove fresh ink stalns (old ones less so) with out affecting the colors of the fabric, as is the result when oxalic acid, chloride of lime, chlorine water, are made use of.

MATCHES WITHOUT SULPHUR. - According to a method patented in France, non-explosive, nonhygroscopie matches may be made by impregnating the wood with a hot solution of a fatty material. The inflammable compound consists of phosphorus 7, gum 7, nitrate of lead 40, glass powder 5, water 10

PROTECTION AGAINST MOTHS.—Pfleider, a German inspector of passenger cars, states that a single stem of hemp, with the leaves and blossoms, mixed with the stuffing of a car seat, will protect it from meths for years, and that hemp for this purpose should be gathered just when in blossom, dried rapidly in the shade, and kept in covered wooden vessels in a dry place.

PREVENTION OF MOLD ON GUM MUCHAGE.-The addition of a few drops of concentrated sulphuric acid to gum mucilage, and then allowing the precipitated sulphate of lime to subside, will, according to Hirschberg's experience, prevent formation of mold or deterioration of adhesiveness for at least a year and a half; while sulphate of quinine, as recom-mended, will not prove effective, at least in the pro-portion of one to twenty of the solution.

REMARKABLE ELECTRICAL PROPERTY OF GLYCER-INE.-Prof. Waltenhofen finds that when a card is coated with glycerine on one side, and points connected with conductors leading to the coatings of a Leyden jar, or the terminals of a Ruhmkorff coil, are placed in contact with opposite sides, but not exactly opposite each other, the positive in contact with the coated side, the perforation by the discharge will invariably be opposite the positive point, instead of the negative, as in Lulin's experi-

Uses or Scint.-The saint of sheep's wool, or the matter which accumulates therein as the result of perspiration and other excretions, is now carefully collected in various parts of Europe, and made a source of revenue; so much so, indeed, that persons are always found willing to take the crude wool and return it thoroughly cleaned to the owner, finding a profit in the soluble matter obtained by washing. This has been disposed of in various ways; but quite recently it has been found to be excellently adapted to the economical manufacture of yellow prussiate of pofast; as, after heating, it is found to consist of an intimate mixture of potash and nitro-

BEAUTIFUL BROWN FOR WOOLEN.-According to the Musler Zeitung, the follwing method affords the most serviceable brown for woolen and half-woolen goods: After dry removal of all spots with hard soap (for tar stains, butter and soap may be used), the pieces are washed well by hand, and then drawn through a weak, lukewarm soda bath, rinsed, and passed through a warm acid bath. For a 20-pound dyeing bath, 1 pound Roman alum, 8 ounces sul-phuric acid, and 4 to 8 pounds archil, are boiled for 40 minutes, and the shade regulated with turmeric, sulphate of indico, and archil. For yellowish brown, add 1 pound common alum, 8 ounces sulphuric acid. 2 pounds turmeric, 4—6 pounds archil, and some sul-plate of indico. The process desired of the darkest shade should be dyed first.

ASH-COLORED BREED OF TURKEYS .- In the recent report of the Paris " Société d'Acclimatation," it s stated that M. Sénéquier of Poulon has cultivated a race of ash-colored turkeys, a little less in size than the average, but remarkable for their extraordinary fecundity. The female lays throughout the entire year, with a slight interval of repose. She covers her eggs with great assiduity, and is partieularly recommended by M. Schequier for hatching out the eggs of exotic birds. He received the parents of the stock from one of his friends, who was ignorant whence they were originally derived. It may have been developed in that locality under the induce of long-continued too graphical conditions. Specimens of these were to be brought forward at the exhibitions of the Society in 1873.

HASTENING THE RIPENING OF FRUIT.-Acting upon the principle, that renewal of the earth immediately surrounding the roots increases their activity, and accelerates the maturing of all parts of the plant, neluding the fruit, Mr. Stall removed the earth about an early pear tree, eight weeks before the normal period of ripening, for a space 13 to 15 feet in diameter, and to such an extent as to leave a depth of earth over the roots of only about 2-24 inches, which could be thoroughly warmed by the sun. He was surprised not only by the ripening of the fruit in the middle of July, but also by its superior juiciness and havor. In another experiment, the removal of the carth from the north side of a tree, alone, caused the fruit on that side to ripen several days earlier than that on the south-side. Frequent watering was of course necessary in the above experiments.

MORDANT FOR ANLINE COLORS ON COTTON.-Until recently aniline colors have been fixed on cotton by treatment with animal matter, as albumen, casein, gelatine, or with galls, sumac, tannin, as well as by the use of mordants of acetate of alumina, soap, and oil. Dr. Reimann, however, directs attention to the peculiar power possessed by starch of abstracting aniline colors from solutions, this not being due to the gluten it contains, since this property is shared equally by wheat and potato starch erty is shared equally by wheat and portato staren; and he founds upon this a beautiful method for fixing antiline colors on cotton. It is immaterial whether the color is attended by the starch suspended in the liquid or attached to the fiber. If the cotton is saturated with a thin paste of potato or wheat starch, and then steeped in a dye-bath of antiline color, it will receive the corresponding

COHN ON BACTERIA.-Dr. Cohn, who has written a great deal upon bacteria, de mes them as "chlorophyl-free cells of spherical, oblong, or cylindrical form, sometimes twisted or bent, which multiply themselves exclusively by transverse divisions, and occur either isolated or in cell-families," He divides them into four groups or tribes, and indorses Burdon-Sanderson's method of distinguishing bacteria from Sanderson's method of distinguishing discretar too torule, namely, that the latter, or fungi-spores, may be transported in the air, while bacteria require a surface of water for this purpose. Bacteria have near affinities with algre, and resemble green plants near affinities with algre, and resemble green plants in taking up their nitrogen from ammonia compounds, which animals are unable to do. They differ from green plants in not being able to take their carbon from carbonic acid, but requiring carbonydrates and their derivatives. Columgives proofs that, practically, a temperature of 175°, F., destroys the life of bacteria, and prevents their development in an organic infusion.

MIRRORS FOR REFLECTING TELESCOPES.-Prof. H. L. Smith of Hobart College, Geneva, N. Y., makes the following communication regarding an improvement in the manner of making very large mirrors for reflecting telescopes. He says: "I ground and prepared a bell-metal speculum, which I coated with nickel, and this when polished, proved to be more reflective (at least I thought so) than speculum metal. The two objects which I sought were-first, to have a polished surface unattackable by sulphur etted hydrogen (this, for example, is not injured by etted hydrogen (this, for example, is not infrired op-packing with lucifer matches), and secondly, for large specula, doing most of the work by the turning tool and lathe. I really think a large (say three-foot) mirror coated with nickel, but cast of iron, and finished mostly in the lathe, while it would not cost the tenth of a similar-sized speculum metal, would be almost equal to silvered glass of the same size, and vastly more enduring as to polish."

DERMESTES DESTRUCTIVE TO SILK-WORM EGGS.

Among the various destructive insects which interfere with the naturalist by destroying his specimens one of the most formidable, on account of the extent and rapidity of its ravages, is the well-known Dermestes lardarius, or ham beetle. This devotes itself especially to the dried muscle, as also to the skins of animals prepared without an abundant application of arsenic. Quite lately it has made its appearance as among the greatest pests of the silk culturist, in onsequence of its habit of laying its eggs along with those of the female silk-moth; and the former hatching out rapidly, destroy the eggs of the latter before they can be removed for further cultivation. before they can be removed for further cultivation. It is highly probable that this habit, so inconvenient in the present case, when exercised upon the ordinary species of butterflies and motles, may serve an excellent purpose in preventing their undue multiplication; but it has become quite necessary to adopt some method to prevent this injury to the eggs of the silk-worm. The remedy consists in first thoroughly washing the wood-work of the chamber where the eggs are laid with a solution of carboin acid, or by temigrating it with sulphide of carbon.

another powerful insecticide, closing the win-dows, and then placing a screen of fine wire gauze outside the window so as to prevent the entrance of the dermestes.

REDUCING THE INTENSITY OF A NEGATIVE .- AC cording to Letalle a negative can be diminished in intensity by first washing it and then covering it with a solution containing 15 grains of chloride of gold and .53 of a quart of water. The operation is to be repeated until the plate has obtained a proper tone. A quantity of nitric acid is then to be poured on one corner, enough to cover the whole plate, when the sirver is immediately dissolved and almost disappears. It is then to be recoforced with sulphate of iron, and then reappears with a great degree of transparency. Pyrogallic acid may be made use of to bring it up both to the desired degree of intensity and to that of transparency. The image which re-mains after the application of the nitric acid, on ac-count of its great transparency, is well adapted for

PREPARATION OF COTTON FOR COLLODION .- M. Adolph Martin of Paris has lately suggested a new mode of preparing cotton for collodion, which is extremely soluble and well adapted for many purposes of photography. For this purpose he takes two parts of sulphuric acid of 66°, to which he adds one part of dry nitrate of potash. When the mixture reaches the temperature of 130° F., the cotton is introduced in small bunches, taking care to allow it to become moistened as rapidly as possi ble. After seven or eight minutes the whole i turned into a large quantity of water and repeatedly washed. These washings are continued until the cotton becomes completely neutral, and it is then carded with copper cards to remove all its pulverulent matter. The proper proportions are eight grammes of cotton to 399 grammes of the mixture above mentioned. above mentioned.

TREATMENT OF WOOL BY GLYCERINE.-According to Asselin, glycerine has hitherto failed to answer its expected part in the treatment of the fiber of wool for dyeing, in consequence of a want of knowledge of its actual properties as a solvent, and he has seen engaged in determining the degree of solubility in glycerine, first, of the metallic soaps and those of magnesia and of lime; second, of the subscaps, or soaps with an excess of base; third, of the sulphate of lime of calcareous waters. As the result of his labors he comes to the conclusion that a rational and moderate use of giveerine in the treatment of wool will aid in the manufacture of certain tissues of uniform tints and of bright colors, which has been considered impossible by some. Fabrics worked from
wool so treated always possess great superiority, in
their soft and pleasant feel, quite different from that
where glycerine has not been camployed. The calcareous waters which are so constantly met with in
manufacturing regions will be no longer an objection when glycerine is employed. Should the glycerine occur in any excess in the worl it can be easily
removed by washing in distilled water. will aid in the manufacture of certain tissues of uni

ALLEGED NEW POTATO DISEASE .- A new potate disease is described as having made its appearance near Jena, differing from the one commonly known in its directly attacking the tubers, and not the eaves. The tuber becomes covered by a purplish felt, which is the mycelium of a fungus. The skin of the potato is sometimes apparently not penetrated by the mycelium, the contrary being the fact in other cases. In the latter event, the tuber becomes completely destroyed by a cancerous discase. The fungus belongs to the genus Seleroticum, and, according to Prof. Holliss, the remedy with and, according to Prof. Holliss, the remedy will probably be the same as in the ordinary potato discuse—namely, the selecting of early kinds, using only mineral and no animal nor vegetable toanures, and with a careful selection of the best adapted soil. The Rev. M. J. Berkely, the eminent funcologist, however, has lately announced that this is the well-known "Copper Web," which some years is very destructive to asparagus, mint, and other crops, and has been known, to some extent, to attack the potato. It is figured in Telasne's "Fangi Hypogei," under the mame of Rhizoctonia.

that a number of cases have occurred in Berlin where colored woolen garments, worn next the skin have produced a peculiar kind of poisoning. Violetgray woolen stockings, after having been worn less than six hours, caused reduces of the skin, and permanent pustules, in connection with feverish symptoms, and constipation. The same results followed after the stockings had been treated with beiling water. Similar symptoms were produced by gray coolen shirts, next the sgin, and by the red binding woolen shirts, next the skin, and by the red binding of others. He considers the aniline colors as a rule poisanous in their action upon the skin, as has been established in regard to coralline, in spite of all denials; the exceptional character of a few in this respect being difficult to establish. He recommends, therefore, that woolen garments colored with aniline colors should not be worn next the skin, and suggests as a test for these colors, that a portion of the wool be heated to boiling, in a test-tube, with 90 per cent alcohol, and if the latter acquire a red, violet, or violet-blue tint the coloring matter is suspictions.

Potsonous Woolen Goods,-Dr. Hagar states

GRYNET PROCESS OF PHOTOGRAPHY .- A simple process of photography, according to Mr. Geynet, con sists, essentially, in printing from a layer of prepared gelatine, which gives capital half tints. For this purpose 100 centigrammes of water and five grammes of gelatine, two grammes of isinglass, and two of Flanders glue are dissolved together, and two to five grammes of bichromate of potash (according to the intensity of the negative desired) are to be added. This is to be filtered through a flaunel cloth, and then spread upon plates of copper highly polished and carefully oiled. The plates are next to be dried in a stove, heated to 104" Fahrenheit, and then exposed, under a negative, for one hour to then exposed, under a negative, for one hour to diffused light, or five minutes to the sun. When the timest details are obtained the plate is to be removed, and the gelatine layer allowed to soak in pure water for an hour and then dried, when it is ready for an impression. It is afterward to be treated like a lithographic stone by passing a wet sponge over the surface, and applying ink by means of a very hard roller. The impression should be taken upon glazed paper, which need not be dampened. A single plate will furnish two hundred impressions. This process is quite similar in character to several that have been more or less in use; but it is so extremely simple as to be worthy of more extensive introduction. ole as to be worthy of more extensive introduction. GLUE FOR PARCHMENT PAPER IN MAKING SAU

SAGE SKINS .- The secret of the composition of the glue employed for fastening the parchment paper of the artificial skins for sansages, and which resists boiling water and all forms of moisture, seems to be well kept; but the one indicated by Dr. Stinde in the Photographisches Archiv is claimed to be equal to it in all respects, if not indeed identical. Add to one quart of a good adhesive solution of gelatine or glue 370 to 440 grains of finely powdered bichromate of potash. Warm the mixture slightly on a water bath when about to use it, and before applying it moisten the parchment paper. The latter, when glued with this preparation, as in the formation of the small cylinders for sausages, must be rapidly dried on a hurdle and then exposed to the light until dried on a hurdle and then exposed to the light until
the yellow glue becomes brownish. These cylinders
are then slowly boiled in a sufficient quantity of
water, to which two to three per cent of alum has
been added, until all the chromate is dissolved out,
and they are then washed in cold water and dried,
and will look very inviting, if white gelatine has
been used. Prof. Böttger informs us that a similar
result may be reached by using a concentrated solution of cellulose in ammonacal oxide of copper.
Thus, if cylinders of unsized paper (as stont Swedish
filtering paper) are formed with this paste, and when
thoroughly dry are drawn through a parcimentizing
solution (viz., a cooled mixture of two volumes of solution (viz., a cooled mixture of two volumes of fuming sulphuric acid and one volume water) they will be beautifully parchmentized, and after the neutralization of the acid, washing, &c., will present a striking resemblance to natural intestines.

THE FOSSIL HORSES OF SOUTHERN EUROPE. Mr. Sanson, in a paper upon the fossil horses of the quaternary period, remarks that it is probably an error to consider such remains as belonging to the Equus caballus, or true horse, or some of its varieties; and he states that it is quite impossible to distin guish, by the imperfect fragments usually examined, between this species and the Equus asinus, o the original of the domestic ass. As the result of careful comparisons on his part, he finds that almost the only specific distinction between the horse and the ass is to be found in the orbital apophysis of the frontal bone. This, in the ass, is very much wider than in any of the horses, and its external surface and anterior border are decidedly rugose, in place of being smooth, as in the horse; and its edge, which or being smooth, as in the first in the lass is in the form of the capital letter V. The external orbital meatus is also much larger in the asses; but it is meatus is also much larger in the asses; but it is respect. meatus is also much larger in the asses; but it is difficult to frame a positive diagnosis in this respect. The form of the apophysis will always be its charac-teristic. From his own investigations he is more strongly inclined to conclude that the tossil remains of Eautas of Southern Europe are much more likely

to belong to the ass than to the horse, the former baing more particularly adapted to a southern habitat. He therefore thinks it is well to urge upon inquirer renewed diligence in their criticism, so as to determine more accurately the comparative ranges of the

LYONS INSTITUTION FOR THE ADVANCEMENT OF EXPERIMENTAL SCIENCE.—An important enterprise has lately been initiated by the municipal administration of Lyons, in France, in the form of an establishment entitled the Lyons Institution for the Advancement of Experimental Science, and intendet. to be a worthy rival of the richest establishments in Germany, France, or England. The report of the Committee appointed to prepare a plan for this enterprise has recently appeared, and contemplates, among other provisions, for biological science, First, A large central laboratory, in which investigations of any kind can be prosecuted; Second, A. central apparatus room : Third, A laboratory of biological chemistry; Fourth, One of biological physics; Fifth, One of osteology; Sixth, A room for investigations into the disease caused by parasitic animals, including that of the silk-worm; Secenth, A portmortem room; Eighth, A room for delicate disections and the mounting of specimens; Aisth, A work and tool shop; Icath, A cabinet of collections; Eleventh and Tuclith, A drawing-room and photographic establishment; Thirteenth, A library; Fourteeuth, A lecture room; Fifteenth, Apartments for lodging animals; Sixteenth, A greenhouse and inclosure for researches in vegetable physiology. In addition to these there is a provision for general office, rooms, the residences of the director and assistants of the director, the librarian, and three aids, one for operations and autopsies, another for biology, physics, and chemistry, and a third for microscopical investigations and labors in zoology. It is also thought probable that to these will be added a physical and chemical establishment on an equally large scale. According to the plans submitted the buildings will cost \$190,000, of which over one-third will be expended during the present year. An annual allowance of \$6,000 will be made for the biological work. logical chemistry; Fourth, One of biological physics; ogical work.

BOOKS OF THE WEEK.

pp. 222. (Petersons.).
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